WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005GU55B

Title: Anthropogenic Impact on nitrogen cycle in Tumon Bay using 15N, and 14 N isotopic ratio method.

Project Type: Research

Focus Categories: Water Quality, Toxic Substances

Keywords: Nitrogen cycle, isotopic ratio, algal growth

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $35,264

Non-Federal Matching Funds: $0

Congressional District:

Principal Investigators:
Maika Vuki

Gary Denton
WERI University of Guam

Abstract

Algal bloom along the Tumon Bay in Guam is a major concern. Tumon Bay is the tourist hub for the island of Guam and the increasing pollution due to nutrient enrichment and subsequent algal bloom is an eyesore and could potentially have negative impact on the tourism industry on the island.Early studies have clearly shown the excessive growth of green alga Enteromorpha clathrata. One of the possible sources comes from freshwater springs that discharges in the form of springs and seeps along the entire bay area. These spring water flow from aquifers of the northern lens of the island. The levels of nitrates are significantly high in these springs to sustain algal population along the estuarine. However, the increasing stands of algal bloom may be due to the rapid industrialization along the bay area. The critical question is what are the major sources of enrichment along the estuarine. Clearly the input from the catchment that discharges to the entire bay will need to be considered. Previous studies have focused on determining the levels of nitrogen containing nutrients and phosphate in the receiving waters and the intertidal water zone along the bay. While these data has been useful in confirming the enrichment

status, it lacks clarity as to the origin of the pollutants. Human impact through fertilizer applications, construction work, commercial operation such as restaurants, shopping malls, certainly have an impact but there is limited data on the extent and its role in the increase of algal growth. The aims of this study are

1. To determine the different forms of nitrogen compounds in the water system on Tumon Bay. This will involve determining the levels of nitrates, nitrites and ammonia in all the possible inputs including those that has been studied

2. To determine the isotopic ratio of stable nitrogen isotopes, 15N and 14N at the different components of the nitrogen cycle (water, plants, fish, invertebrates) in order to discriminate the contribution of human or animal waste nitrogen from fertilizer and industrial nitrogen

3. To determine the mechanism of nitrogen uptake through the different levels of the nitrogen cycle based on the data collected.

4. To compare the findings with previous data on the levels of nitrogen containing nutrientsThe results from this study should be able to pinpoint the sources of nitrogen enrichment along the bay and assist the management in designing suitable measures for minimizing pollution. This study will also train student at the university to conduct environmental analysis and deepen their appreciation for chemical processes pertaining to pollutants in the environment. It would also enhance the institute and the department on training on new technique, isotopic methods, that will be used in this study.